

Residential Fiber Slowly Becomes a Reality in Western Europe, Part 2

Executive Summary

Fiber to the home (FTTH) is becoming a reality in parts of Western Europe. Although subscriber numbers will remain dwarfed by DSL and cable for the next decade (see Exhibit 1), optical fiber is the broadband access technology of the future.

Despite infrastructure costs slowing the development of FTTH, this nascent market is seeing significant activity, largely in the form of partnerships between alternative network operators, power utilities, local municipalities, and property owners.

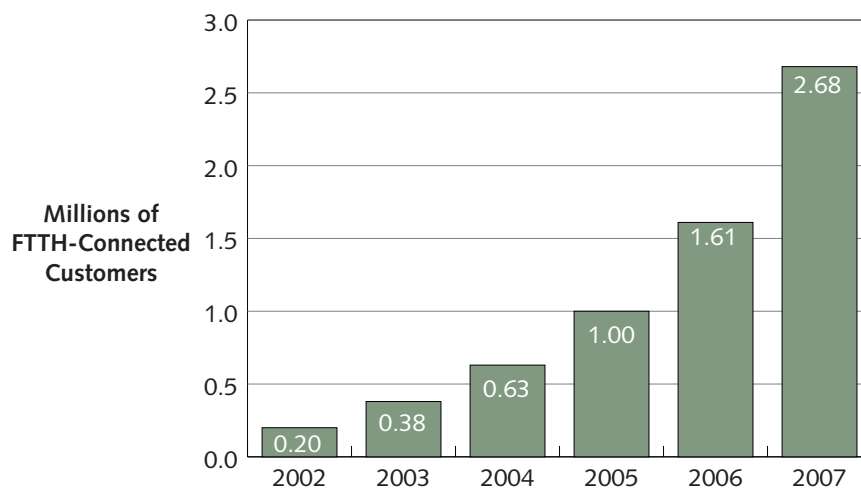
The growth of FTTH services in Europe will depend upon the successful development of the business models we discussed in part one of this report that differ significantly from those for cable and DSL and will inevitably vary to some extent among country markets.

Thanks to the open network model that characterizes many of today's fiber projects, broadband service providers can offer multiple services cost effectively via IP and Ethernet using a shared FTTH infrastructure. Consequently, the isolated pockets of fiber deployment that have developed so far will grow in size and number.

In this report, we look at the current commercial services across Europe, and conclude fiber penetration will grow steadily. However, in the next 5 years, FTTH will not pose a significant challenge to DSL or cable modems. Penetration at the national and regional level will be extremely inconsistent, driven by wide variations in local conditions.

Exhibit 1 Residential Broadband Fiber Subscription Growth in Europe

Source: The Yankee Group, 2003



Although dwarfed by DSL and cable for the next decade, optical fiber will become the broadband access technology of the future.

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We also summarize the range of FTTH service offerings available today and discuss how service providers are putting some of the business models discussed in part one of this report into practice. Two case studies illustrate how different approaches to FTTH deployment can work in different markets. The conclusion summarizes our predictions on the course of FTTH development, as well as offers recommendations for network operators and BSPs on to approach the implementation of residential fiber services.

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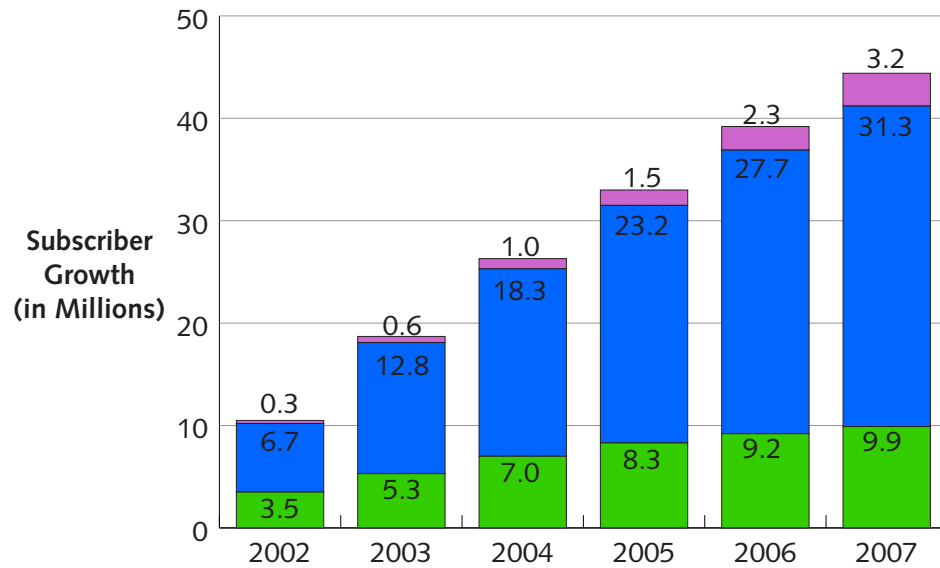
I. Introduction

Consumer broadband grew rapidly in the last 18 to 24 months. Cable modem and DSL technology remain the dominant means by which most Europeans receive high-speed Internet access. In Western Europe, approximately 98 percent of all broadband connections (faster than 128 Kbps) are either DSL or cable modem; these technologies will continue to dominate for several years (see Exhibit 2).

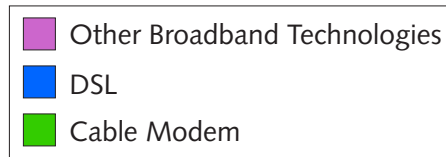
The success of DSL and cable modem technologies has created a virtuous circle that will result in their increasing dominance over time.

However, the lifecycle of these technologies will peak as demand for more bandwidth-hungry applications grows and as alternative means of access expand. In the discussion of alternative access in part one of this report, we concluded optical fiber promised to become the preferred broadband technology of the future.

Despite the continued dominance of DSL and cable, several FTTH deployments have already begun across Europe. Will fiber have the legs to mount a long-term challenge to DSL and cable modems in Europe? Will it shorten the life of those technologies, and do major broadband providers need to think about replacement cycles already?

Exhibit 2**European Broadband Subscriber Growth by Access Technology***Source: The Yankee Group, 2003*

Through 2007, DSL and cable modem services will continue to outstrip other broadband technologies.



II. Summary of Current Offerings

A key commercial consideration when planning an FTTH business case is whether customers will respond to gradual increases in bandwidth or whether service providers should make a single leap of 10 Mbps or more. Most operators offer a 10-Mbps minimum connection, although Ivisjon also offers lower-speed connections at lower cost. Although high-speed access and video services are central to most FTTH offerings, service providers increasingly see voice as a must to compete effectively against the incumbents that dominate both the voice and broadband consumer markets. Exhibit 3 summarizes the service offerings available to customers on today's FTTH networks.

Exhibit 3

Summary of Commercial FTTH Offers

Source: *The Yankee Group, 2003*

Service Provider	Internet Offer	TV Offer	Telephony Offer
FastWeb	Up to 10-Mbps symmetrical: unlimited use bundled with €67, €85 and €110 monthly Internet, TV and telephony packages; 500 minutes of use bundled with €35 monthly package; €1.90 per hour charged with €30 and €41 monthly packages	Linear, multi-channel TV: €10 per month; VoD (movies) and SVoD (TV programs) with PVR option: €5.90 per month; VoD movies: €3 to €6 per title	Free bundled calls to wireline numbers with €41, €67, €85 and €110 monthly Internet, TV and telephony packages; €0.012 per minute with €30 and €35 monthly packages; €0.025 per minute for video telephony calls, which are bundled free with the €110 monthly package only; pay-per-use for calls to mobile and international numbers; free unlimited calls to other FastWeb customers
B2	10 Mbps: SEK320/month (€36)	PC-based VoD: children's movies: SEK19 (€2.09)/24 hours; other movies: SEK39 (€4.34)/24 hours; TV programs: SEK9 (€0.99)/24 hours TV channel streaming to the PC: BBC Prime, BBC World and National Geographic: free with broadband subscription	SEK99/month (€11)+ per minute charges set 10% below those of incumbent
BoStream	10 Mbps/100 Mbps: average cost is SEK 275/month (€31), but can be as low as SEK120/month (€13) depending on the number of homes connected within a building	Music video streaming: €3.19/month for unlimited usage VoD: €4.42/24 hours or €6.50 per 3 titles for 3 days (premium movies); €3.19/24 hours (archive movies); €2.09/24 hours (children's movies, TV programs); €0.99/24 hours (short documentaries)	
AE Broadband Ivisjon/Los	500-Kbps symmetrical: NOK449 per month (€55); 2-Mbps symmetrical: NOK579 per month (€70); 10-Mbps symmetrical: NOK1,200 per month (€146)	Subscription TV service bundled with broadband access includes 15 TV channels, 9 radio stations, VoD, NVoD, local news information and channel package options: NOK90 per month (€11) in addition to Internet subscription	Telephony to be launched in first quarter of 2004

III. Developing Business Models for FTTH

European telco involvement in FTTH has been limited, largely because of incumbents' reluctance to invest in expensive infrastructure they might have to share with competitors. Some incumbents (and alternative operators) are collaborating with infrastructure providers and providing fiber equipment and services. However, incumbents are typically cautious about rolling out broadband infrastructure and services to areas beyond the most lucrative urban centers because this presents a significant financial risk. Incumbents are understandably ambivalent about developing and promoting FTTH infrastructure and services, which, if successful, would ultimately cannibalize their established PSTN and ADSL markets. As a result, many telco FTTH initiatives have amounted to little more than token responses to political and regulatory pressure to invest in and promote wider availability of broadband.

The elimination, or pre-emption, of competition is a major motivation for incumbents in developing alternative infrastructure projects. European telcos' aggressive DSL rollouts during 2000 and 2001 were driven by the joint threats of cable modem services and the prospect of being forced to open up their copper networks via local loop unbundling. However, commercial and regulatory pressure will force telcos to upgrade or replace their aging copper networks with an infrastructure capable delivering high-bandwidth, next-generation services to the majority of the population.

Public and Private Partnerships in Sweden

The combination of central and local government efforts has facilitated the development of FTTH in Sweden. There is an official commitment to make high capacity infrastructure available nationwide including less populated rural areas. Based on an estimated €6 billion required to deliver a fiber-based infrastructure for the entire population, the Swedish government contributed somewhere between €525 and €780 million to the development of local and regional broadband availability with the understanding that market forces will propagate further development.

A significant proportion of the government funding came from Sweden's national grid operator, Svenska Kraftnat, to build a national backbone network. However, the central government's role is largely limited to providing instructions and recommendations (rather than funds) to broadband project participants.

TeliaSonera and several local municipalities have teamed up with their subsidiary power companies to develop fiber infrastructure in Sweden's smaller cities and towns. Clustering initial demand from local government employees, SMEs and community institutions, these stadsnets, or city networks, can be attractive to network operators and service providers that might be deterred from investing in sparsely populated areas. There are about 200 stadsnets, 80 percent of which are owned by the cities and 20 percent by private companies. Approximately 60 to 100 municipally controlled power utilities are currently involved in FTTH deployment throughout Sweden.

Few of the city networks have fiber all the way to the customer premises; the last mile is typically connected via copper leased from TeliaSonera's network. Many local authorities have connected town halls, schools, hospitals and libraries to their city networks and are now looking to connect residences and SMBs. However, the process is expensive and slow.

Because large parts of Sweden are sparsely populated and do not attract many BSPs, some local authorities have decided to provide ISP service. However, other BSPs are allowed to compete for customers on their networks.

The government will provide financial support to municipalities on the condition they allow other parties to provide services and participate in developing the infrastructure. Because many local authorities are heavily dependent on government assistance for the development of their infrastructure, most wish to attract competitive ISPs.

Although Sweden's main cities are now well equipped with dense fiber infrastructure, broadband rollout is far more inconsistent in the rest of the country. Sweden encourages its 289 municipalities to apply for government funding to develop area networks connecting local towns and villages, and subsidies to join these networks to urban centers. To further stimulate local demand, the government has asked a number of state-owned companies to make their infrastructures available for the development of a national backbone that links regional and local broadband networks. These companies include the national electricity utility Svenska Kraftnat, railway infrastructure provider Banverket, TV broadcaster Teracom, and incumbent telco TeliaSonera.

A pattern is emerging: A large number of city networks connect to form larger regional networks; on a national level, utility companies also link their infrastructures to the regional city networks. The goal is to develop a national network of small stadsnets, all interconnected via the larger regional and national backbones. Seven areas have followed the plan so far—the smallest linking five and the largest comprising 34 interlinked stadsnets. Some 160 stadsnets are already connected in this way, including Stokab's network that links 29 municipalities in and around the Stockholm area.

TeliaSonera has acquired and developed some local fiber projects, but for the past 2 to 3 years has focused on pushing its ADSL product to existing customers while reserving fiber for greenfield developments. The high proportion of MDUs in Sweden means that fiber to the building is more common than fiber to the home, with the final drop to individual apartments typically being completed using Cat5 copper. Individual homes are linked to a data switch at a central point within the building—typically the basement. This switch connects to routers within the local, urban and regional backbone networks. The service is commonly referred to as fiber LAN.

A housing company originally developed TeliaSonera's largest FTTH island of about 4,000 apartments. The telco won the tender to operate this network. It also has developed smaller networks, mostly connecting fewer than 100 apartments—some independently and some in cooperation with other companies. All the FTTH islands have optical terminations delivering 100 Mbps connections directly into the home, normally consisting of multimode fiber and LED technology. The rest of TeliaSonera's LAN accesses are based on combinations of fiber and Cat 5 copper, which is the most common means of connecting the final drop from the curb or basement to the home. The networks vary from very small (a few homes) up to a 32,000-apartment installation in Malmo, which is operated by HSB, the property's housing cooperative owner. HSB Malmo charges tenants SEK275/month (€30.60) for a 10-Mbps Internet connection.

The entity that builds, owns and operates these networks varies, although TeliaSonera has taken on all roles and in combination with other parties. TeliaSonera believes there is a growing trend toward local communications infrastructure being viewed like other local infrastructure, such as plumbing and power, which are integral parts of the buildings they serve. This view means that the building owner also owns the fiber—a different structure for incumbents.

TeliaSonera has 12,500 to 17,500 fiber LAN customers out of 45,000 homes passed in Sweden. This compares unfavorably with the telco's DSL subscriber base of more than 400,000. It also represents a modest proportion of the entire Swedish fiber LAN market, which the regulator's year-end statistics estimated at 123,500 private and 3,300 business customers. (The total would be higher if the significant number of users on small local networks that are not included in the official statistics were taken into account.)

A Landscape of Mixed Infrastructures

The network run by Stokab for the city of Stockholm connects schools, local government and public administration agencies including those located in the outskirts of the capital. The project is bringing fiber closer to suburban homes. Although Stokab will have connected the majority of these by the end of 2005, it is using fixed wireless access as an interim solution.

To compete effectively for broadband market share, many FTTH network operators and service providers are looking to extend the reach of their fiber by gaining access to TeliaSonera's copper infrastructure. Wholesaling the incumbent's DSL service or renting its unbundled copper loops gives fiber providers a means of completing the final drop to the customer premises. This helps defer or bypass the expense of last-mile fiber connections.

The Swedish Urban Networks Association, an interest group set up to steer the deployment and viability of the stadsnets, anticipates all stadsnets apartments will be connected via direct fiber and copper (either Category 5 or DSL) with a minimum 10-Mbps connectivity.

Italy's FastWeb is also pursuing a mixed infrastructure strategy (discussed in the following section). We see this approach, which utilizes existing technology to optimize costs and support customer acquisition, as a realistic way to develop FTTH networks.

Multiple Roles for FTTH Players

The open network approach enables multiple scenarios and business models for network infrastructure and service providers, with some parties alternately providing infrastructure, wholesale services and retail services according to local market conditions. One stadsnet might offer only dark fiber, while another could become a service provider when end-user demand is too low to gain interest from larger BSPs.

IP-Only is a facilities-based provider of leased dark fiber. The company also sells wholesale broadband access and telephony to small business and private customers connected to its fiber network in seven Swedish city networks. The services it sells include fixed Internet access (up to 10 Mbps for residential customers, typically costing around SEK200 per month, plus a connection fee), and small business packages with dedicated access and low-cost IP telephony. Prices and terms vary for each city network according to their different charging schemes. IP-Only currently provides 10-Mbps Internet access and IP telephony. Internet access and telephony are also provided wholesale to operators and ISPs outside the reach of the city networks.

Variable Country Market Potential for FTTH

Residential fiber is likely to make an impact in **Denmark**, where a decision is expected in the fourth quarter of 2003 on the rollout of what would be the one of the largest European FTTH rollout (behind only FastWeb and B2). The country's largest power company, NESAs, is building a fiber network that will pass 200,000 households. The company needs to replace its overhead powerline system, much of which was damaged in a recent storm. The company will install new lines underground along with a network of fiber ducts.

Iceland also has considerable FTTH activity with a high degree of involvement from power companies.

Norway has a handful of small fiber projects under way, most passing fewer than 1,000 households each. Some of these are the result of power company and housing initiatives as well as EU funding for rural projects. However, Norway's FTTH development is hampered by a lack of central government involvement and the presence of a very strong incumbent telco. In addition, the country's rocky landscape makes digging slower and more costly than in most countries. AE Broadband and Lyse Tele are examples of Norwegian regional FTTH deployments based on utility company initiatives.

Germany differs from other markets because most of its large cities already have fiber-based networks owned by a combination of municipal, utility and commercial parties. The networks provide mostly business interconnect and services to municipal employees. Some of these networks, such as Hansenet, are also providing residential ADSL, but there is no significant FTTH focus. The huge dominance of the incumbent's DSL network and the existence of a mature cable TV market do not bode well for the development of FTTH in Germany. This would require a more competitive climate and an open network approach to infrastructure provision.

The utility approach to broadband development is lacking in the **United Kingdom**. In the U.K., infrastructure-based competition relies almost entirely on the capital markets for survival, which is highlighted in the recent financial plights of cable operators ntl and Telewest. With the exception of Italy, we expect most countries in southern Europe, where PC and Internet penetration lag behind the rest of the region, will take longer to develop FTTH than in most of the northern countries.

In August 2003, regional broadband development in **France** received a setback when the senate amended a proposed parliamentary law allowing local authorities to become telecom operators. Now, operating licensees will only have the right to operate telecom networks where there is a proven lack of private initiatives. Although the amendment is likely to deter direct municipal involvement in regional broadband (including FTTH) projects, local authorities can still provide funding to private network operators where deployment is not deemed economically viable. Even when granted network operator licenses, local authorities will most likely use these to exercise freedom of choice in selecting partners for building and operating network projects.

In **Spain**, the broadband landscape has a mix of alternative access technologies, with strong cable modem and DSL markets, and significant initiatives in fixed wireless, satellite and powerline communications. The many types of access has likely crowded the market to the extent that fiber has had little influence on the plans of Spain's infrastructure providers and BSPs.

IV. Case Studies: Real-World FTTH Deployments

FastWeb

The success of the facilities-based alternative operator, FastWeb, which had more than 100,000 connected residential fiber customers by the fourth quarter of 2003, puts Italy alongside Sweden at the front of Europe's FTTH market. To maximize network utilization and revenue potential, FastWeb offers services to SME and corporate clients as well as to residential and SOHO customers. Its core consumer offer, available to both ADSL and fiber customers, comprises multi-channel TV, high-speed Internet access, and IP telephony. The services are available to consumers either standalone or as part of a discounted bundle. To attract new customers and increase spending, the company offers additional options such as VoD, premium TV and video telephony. FastWeb enjoys a monthly ARPU of more €66, which is triple that of the incumbent, Telecom Italia, and on a par with the ARPU of BSkyB in the U.K., Europe's most expensive pay TV market.

Starting in Milan, and then expanding into Rome, Bologna, Naples, Turin, and Genoa, FastWeb has pursued a strategy of saturating cities with fiber and presenting a consumer offer that competes against that of the incumbent on speed, price and scope. FastWeb offers residential customers a triple play of linear IPTV content, unlimited national landline voice calls and 10-Mbps Internet served over FTTH for €85 per month. This price compares favourably with Telecom Italia's Alice Mega package, which offers only 1.2-Mbps access with no video service and retails for €133.47. FastWeb also offers IP connectivity and a range of services to small businesses located in MDUs.

The civil infrastructure for the initial rollout phase in Milan was built by MetroWeb, a company formed by e.Biscom, FastWeb's parent and AEM, the local electricity utility, which also contributed the network's first 120km of passive infrastructure. MetroWeb was responsible for digging and laying the fiber cables, while FastWeb installed the active equipment and implemented service. FastWeb laid the cables for the remainder of the network outside Milan. The network currently comprises 10,800 km of fiber, of which 2,500 km is installed in Milan.

E.biscom's partnership with AEM gave FastWeb a significant startup advantage by providing expertise and contacts in civil works. More important, the company, which is Italy's second largest power utility, enjoys strong cash flow, presenting a credible business case for the project from the outset. A well-timed IPO funded FastWeb's capital-intensive rollout in 2000. The company became EBITDA-positive in the second quarter of 2002, so FastWeb will have a €100 million EBITDA for 2003 and expects to become cash-flow positive in 2005.

FastWeb's geographic expansion was helped by the national regulator, which forced Telecom Italia to grant access to parts of unused *Socrate* cable TV network infrastructure. The majority of FastWeb's cables outside Milan have been installed within *Socrate* ducts.

FastWeb's rollout strategy is to expand its network and acquire customers rapidly and before Telecom Italia responds, connecting the more densely populated areas with fiber and the more sparse areas via DSL. Initially, FastWeb builds fiber to central offices and acquires customers through unbundled DSL connections. DSL customers may eventually be migrated to fiber once overall subscriber take-up has reached critical mass. Apart from the connection speed, the DSL service offering is identical to the fiber offering.

Content acquisition was one of FastWeb's strongest challenges but has become one of its most significant achievements. It has partnerships with RAI (the state-owned TV company) and Sky Italia, to package and distribute their premium content. FastWeb's key differentiator from terrestrial TV networks is its true video-on-demand service, which contains libraries of films from a variety of sources. In 2002, e.Biscom made content distribution deals with several major film studios and the operator has managed to secure favorable release windows for top titles, so that hit films go on sale shortly after they are available for rent in video shops.

FastWeb is a prime example of a company choosing the right time to launch a large-scale fiber rollout and finding a market for its multi-service product. Much of its success is attributable to some very specific market conditions, particularly the lack of cable competition in Italy, the density of the population—most of which is in MDUs—and the lack of facilities-based competition (apart from the incumbent) in the business market. Coupled with access to Telecom Italia's ducts and unbundled copper loops, this has helped facilitate its aggressive rollout strategy.

Bredbandsbolaget (B2)

Since starting business in 1998, B2 has deployed its own fiber to MDUs in 53 cities and villages across Sweden, providing 10-Mbps Internet access and, more recently, IP telephony and video services to residential and SME customers. B2's network passed 280,000 apartments as of September 2003. The company installed Ethernet sockets to each home and uses Cat 5 copper to connect these to fiber network terminals in each building. B2 has 100,000 broadband access subscribers and 25,000 telephony customers. These two core services are offered as standalone products only, although 60 to 70 percent of telephony customers also take broadband service. B2 offers a limited, PC-based VoD service (with just 200 library movie titles) and a choice of three live TV channels. Plans are under way for the introduction in the next 12 months of a full-scale, TV-based VoD service, for which the network's high bandwidth places it at a distinct advantage over rival cable and DSL providers.

The open access model that prevails in Sweden means that DSL and cable services are also available to buildings on the B2 network, causing intense service competition. Of the 280,000 homes connected to B2, at least 90 percent have access to the cable TV services of ComHem or UPC. For this reason, B2 does not plan to offer linear or multi-channel TV, but plans instead to concentrate on a differentiated offering of on-demand, personalized video content.

Apart from the proposed VoD offering, B2 does not expect to significantly grow ARPU and revenue from value-added broadband services such as security and Internet-based content provision. Rather, access provision will provide the bulk of its revenue for the near future, despite industry consensus that competition is driving broadband access prices down to commodity levels.

B2's core service strategy is to provide superior connectivity at a highly competitive price. Its current offer of 10-Mbps symmetrical access at €36 per month compares favorably with Telia's 512-Kbps ADSL offer (which costs €42 per month). Subscription to the IP telephony service costs €11 per month; call minutes are priced at 10 percent less than Telia's PSTN charges. Current monthly ARPU is €36 for broadband customers and €34 for telephony customers.

B2 is looking to increase the capacity available to end users beyond the current 10-Mbps limit and sees demand for higher speeds among Swedish consumers, despite the dearth of bandwidth-hungry applications. Although only an estimated 5 percent of its customers are heavy peer-to-peer users, B2 stresses that the majority of its subscribers are regular Swedish consumers engaging in frequent activities such as Internet surfing, music downloading and picture file transfers.

A common criticism of FTTH proponents is that the technology is ahead of the market and that consumers have no real need or desire for the high access speeds available over fiber. B2 argues that the availability of greater bandwidth at an affordable price increases its desirability, particularly among the more competitive consumers, many of whom see 10-Mbps connectivity to the home as a prestige product.

B2's network buildout is based on agreements with REOs with whom it has secured agreements for 25 years' exclusive fiber access to the homes within their buildings, after which competitors will be allowed to offer similar services to B2s customers over its network. The REOs pay for the passive LAN components—amounting to €170 to €280 per dwelling—while B2 finances the active components and connectivity to the wide area network. B2 collects all the service revenue, while the REOs benefit from their properties achieving higher occupancy levels as well as increased rental and sale value. In June 2003, B2 started offering ADSL and VDSL services as a way to further utilize its fiber investment. B2 has its own DSLAMs and connected these to local PoPs via its own fiber, so the company leases the last mile from Telia.

BoStream, Sweden's second-largest DSL provider after TeliaSonera, has about 16,000 connected FTTH customers and expects this number to reach at least 20,000 by the end of 2003. All MDU buildings that take the FiberStream service have a 1-GB connection to BoStream's network. BoStream customers can choose a 10-Mbps or 100-Mbps connection. Subscription fees are the same for 10 Mbps or 100 Mbps, but the latter carries a slightly higher activation fee. The 100-Mbps interface option is offered to REOs that may wish to future-proof their properties in anticipation of significant growth in consumer demand for bandwidth. Only two or three buildings are wired up for both 10-Mbps and 100-Mbps services.

Agder Energi Bredband operates a fiber optic infrastructure in the Agder region of Norway and makes its network available to a number of third party service providers that includes **Ivisjon** (which is 50 percent owned by parent company Agder Energy and 50 percent owned by Federlandsvennen, a local media house). In addition to acquiring content and supplying content rights management, Ivisjon provides a tiered bandwidth offering and a TV portal service to approximately 1,000 FTTH customers, a base it expects to double by the end of 2003. The company sells its services directly to consumers via **Los**, an Agder Energi subsidiary set up in May 2003 as the company's marketing and customer services division. AE Broadband is expanding its reach by installing DSLAMs in areas not yet covered by the fiber network, with the aim of signing up subscribers to ADSL and converting them to fiber when FTTH is available.

Lyse Tele, the communications subsidiary of Norwegian utility Lyse Energy, launched a successful 500-home FTTH pilot in Stavanger in September 2002. The pilot will expand by 3,500 homes by the end of 2003. IBM Global Services provided consulting and integration services for the project. Lyse Tele is providing 2-to-10-Mbps Internet access, 40 channels of broadcast TV and flat rate IP telephony for €100 per month. The company

claims this represents a minimum 20 percent saving against consumer's typical combined telecom, TV and Internet costs. Lyse Tele also claims a 40 percent success rate among those marketed with the service. Lyse Tele has rights of way through its utility parent's distribution network (a combination of gas, electricity and heating ducts). Lyse Energy has a footprint of around 110,000 gas and electricity customers in southwest Norway and is building out its fiber network to accommodate speeds of up to 100 Mbps.

V. Conclusions and Recommendations

- **Fiber will happen locally and inconsistently rather than nationally.** DSL and cable, which have grown from a central urban concentration gradually to cover less densely populated areas until achieving near-full geographic or population coverage. Rather, FTTH will continue to develop in a series of isolated but continually growing local pockets situated both in dense urban centers and sparsely populated regions.
- **FTTH will take many years to reach the mass market, which will remain dominated by cable and DSL until at least 2010, and probably well beyond that.** Given the anticipated slow expansion of residential fiber, BSPs planning fiber deployment should consider the approach taken by FastWeb, BoStream and B2. These companies employed DSL to build customer market share in areas not reached by the fiber network. We expect to see a growing trend toward such mixed broadband infrastructures because FTTH penetration will be a much slower process than DSL rollout.
- **Broadband service development entails securing effective video content relationships**—an area where both network operators and broadband service providers are traditionally lacking skill and expertise. Partnerships with wholesale content providers (such as satellite TV networks) and specific content providers (such as film studios) will be crucial to the success of any broadband pay-TV or VoD strategy. FTTH operators face the same hurdle as telcos looking to provide DSL-based video services: acquiring rights to distribute digital content.

Recommendations for Network Infrastructure Owners

- **Adopting the open network approach will pave the way for cost-effective and competitive provision of FTTH services** by reducing the capital burden on service providers and enabling freedom of choice for consumers. It will also remove the incumbents' stranglehold over national broadband services and infrastructure. Opening the network also will enable providers to experiment with business models and service propositions.
- **Incumbents should be aware of the demand for services that cannot be delivered over DSL and consider fiber installations themselves**, particularly as the prospect of broadband-delivered video services looms. This process will allow telecom providers to earn higher ARPU from extra services, assuming video content can be sourced and will serve as a defensive measure against

competitors offering fiber. Moreover, it is the only way to provide a triple-play bundle of sufficient quality to compete with cable and satellite TV companies. Although second-generation DSL technologies can support this, rolling out fiber will help telcos protect their networks in anticipation of even more bandwidth-hungry applications such as HDTV. (FTTH is the only currently available access technology that can support HDTV.)

Recommendations for Service Providers

- **As access prices continue to fall, compelling services are the only way to raise and maintain ARPU.** Although DSL operators typically charge more for higher bit rates, many of today's 10Mbps FTTH offers are already priced competitively against a standard DSL connection offering much lower speeds. BSPs should try to maintain the perceived value of bandwidth by maintaining price points relative to the amount of available access bandwidth (as is the case with B2 and Los). Alternatively (or subsequently), they can offset falling connection prices by introducing services for which consumers are more willing to pay. As a starting point, these should include the two remaining triple play components of voice—in the form of competitively priced IP telephony—and video services.
- **Network operators and service providers must look to video to capitalize on fiber's superior bandwidth.** Delivering two streams of broadcast-quality IP video to the home using today's signal compression codecs requires 10 to 15 Mbps. FastWeb offers linear digital TV broadcast services in Italy; a few of Swedish stadsnets and IP TV must become a basic component of any true broadband offering. True VoD and HDTV are services that will give FTTH providers their strongest differentiator against the cable, satellite and DSL platform operators.
- **Fiber access needs to address corporate and SME demand as well as consumers.** A mass-market broadband play offers modest initial ARPU and a slow ROI. As the multi-segment strategies of B2, FastWeb and telco DSL providers indicate, BSPs should optimize usage of fiber networks and tap into the more lucrative business customer base as an additional revenue stream. This approach is particularly feasible in mixed-development MTU markets where both residential and SME tenants occupy buildings.

VI. Further Reading

Yankee Group Reports

RBOCs Will Not Secure a Competitive Advantage With Fiber to the Premises, Consumer Technologies & Services, October 2003

Can Broadband Service Providers Make Money from Online Video Content?, Broadband & Media Europe, July 2003

Is Broadband for Speed, Volume, Content, or None of the Above?, Broadband & Media Europe, June 2003

Metro ROI Case Made to Go the Last Meter, Convergent Communications Europe, December 2002

Yankee Group Research Notes

BoStream Unleashes Europe's First Consumer VDSL Service, Broadband & Media Europe, July 2003

New DSL Standard With Telco Video Potential Sparks Debate, Broadband Access Technologies, February 2003

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- Delivers a **full line of research reports and research notes** via the Internet and Lotus Notes.



ACCURATE RELIABLE TRUSTED

The Yankee Group

World Headquarters

31 St. James Avenue
BOSTON, MASSACHUSETTS 02116-4114
T 617.956.5000
F 617.956.5005
info@yankeegroup.com

Regional Headquarters

North America

31 St. James Avenue
BOSTON, MASSACHUSETTS 02116-4114
T 617.956.5000
F 617.956.5005
info@yankeegroup.com

951 Mariner's Island Boulevard, Suite 260
SAN MATEO, CALIFORNIA 94404-5023
T 650.522.3600
F 650.522.3666
info@yankeegroup.com

Asia-Pacific

Itochu Enex Bldg., 6F 1-24-12
Meguro, Meguro-Ku
TOKYO 153-8655 JAPAN
T 81.3.5740.8081
F 81.3.5436.5057
asiainfo@yankeegroup.com

EMEA

55 Russell Square
LONDON WC1B 4HP
UNITED KINGDOM
T 44.20.7307.1050
F 44.20.7323.3747
euroinfo@yankeegroup.com

Latin America

Alameda Santos
234, 7° Andar, 01418-000
SÃO PAULO, SP, BRASIL
T 55.11.3145.3855
F 55.11.3145.3892
info@yankeegroup.com.br

Advisory Services

Yankee Group AnalystDirect advisory service annual memberships offer clients access to research and one-to-one expert guidance.

Advisory services represent our best value for clients. The services help our members understand industry, regulatory, competitive, and market-demand influences, as well as opportunities and risks to their current strategies.

Membership includes an invaluable in-person strategy session with Yankee Group analysts, direct access to a team of analysts, research reports, forecasts, research notes, and regular audioconferences on relevant topics.

We offer advisory services on almost 40 selected topics in Telecommunications; Wireless/Mobile Communications; Consumers, Media & Entertainment; and Information Technology Hardware, Software & Services.

Decision Instruments

The Yankee Group offers a full portfolio of technology and market forecasts, trackers, surveys, and total cost of ownership (TCO), return on investment (ROI), selection, and migration tools. Decision instruments provide our clients the data required to compare, evaluate, or justify strategic and tactical decisions—a hands-on perspective of yesterday, today, and tomorrow—shaped and delivered through original research, in-depth market knowledge, and the unparalleled insight of a Yankee Group analyst.

Trackers

Trackers enable accurate, up-to-date tactical comparison and strategic analysis of industry-specific metrics. This detailed and highly segmented tool provides discrete proprietary and performance data, as well as blended metrics interpreted and normalized by Yankee Group analysts.

Surveys

Surveys take the pulse of current attitudes, preferences, and practices across the marketplace, including supply, delivery, and demand. These powerful tools enable clients to understand their target customers, technology demand, and shifting market dynamics.

Forecasts

Forecasts provide a basis for sound business planning. These market indicators are a distillation of continuing Yankee Group research, interpreted by our analysts and delivered from the pragmatic stance our clients have trusted for decades.

Signature Events

The Yankee Group's signature events provide a real-time opportunity to connect with the technologies, companies, and visionaries that are transforming Telecommunications; Wireless/Mobile Communications; Consumers, Media & Entertainment; and Information Technology Hardware, Software & Services.

Our exclusive interactive forums are the ideal setting for Yankee Group analysts and other industry leaders to discuss and define the future of conversable technologies, business models, and strategies.

Consulting Services

The Yankee Group's integrated model blends quantitative research, qualitative analysis, and consulting. This approach maximizes the value of our solution and the return on our clients' consulting investment.

Each consulting project defines and follows research objectives, methodology, desired deliverables, and project schedule. Many Yankee Group clients combine advisory service memberships with a custom-consulting project, enabling them to augment our ongoing research with proprietary studies.

Thousands of clients across the globe have engaged the Yankee Group for consulting services in order to hone their corporate strategies and maximize overall return.

For More Information . . .

Phone: 617.956.5000, Fax: 617.956.5005. E-mail: info@yankeegroup.com. Web site: www.yankeegroup.com.

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